Remarks

Claim Rejections under 35 U.S.C. 103

Claims 1 and 11 are rejected as being unpatentable over Pelekhaty (US 6,215,592) in view of Rancourt (US 4,846,551). Claims 2-3, 8-10, 12-14 are rejected as being unpatantable over Pelekhaty in view of Rancourt, and further in view of Adair (US 6,490,381). Claim 6 is rejected as being unpatantable over Pelekhaty in view of Rancourt and Adair, and further in view of Goossen (US 5,914,804). Claim 7 is rejected as being unpatantable over Pelekhaty in view of Rancourt, and further in view of Mitsui (US 6,042,752). These rejections are traversed as follows:

Regarding claim 1, this recites a thin film filter for dense wavelength division multiplexing comprising: a glass substrate; and a film stack mounted on the glass substrate, the film stack comprising a plurality of cavities; wherein each cavity comprises a first mirror layer, a second mirror layer, and a spacer layer arranged therebetween, both of the first mirror layer and the second mirror layer including low refractive index thin films and high refractive index thin films, and wherein each of the high refractive index thin films comprises a composition of indium-tin oxide having a high refractive index such that a substantially different refractive index between the low refractive index thin films and the high refractive index thin films is formed.

Examiner essentially states that Pelekhaty teaches a thin film filter for dense wavelength division multiplexing, the filter comprising a glass substrate, and a film stack on the glass substrate comprising low refractive index thin films and high refractive index thin films, the high refractive index thin films comprising zirconium oxide; that Rancourt teaches that indium tin oxide may be substituted for zirconium oxide; and that it would have been obvious use the indium tin oxide film taught by Rancourt in the Pelekhaty invention.

Applicant traverses Examiner's reasoning as follows:

Firstly, Pelekhaty relates to a Fabry-Perot optical filter for channel selection in Wavelength Division Multiplexing systems, and Rancourt relates to a filter assembly for improving the image of a cathode ray tube or other luminous display.

Rancourt teaches the filter assembly being for use with cathode ray tubes and other self-luminous displays whereby reduced glare and improved image contrast are realized (column 1, lines 62-64). Light can transmit through a filter assembly, whereas light with a particular wavelength cannot be filtered. The optical filter of Pelekhaty is for filtering a light with a particular wavelength, and belongs to the field of optical transmission communications. Therefore, the two cited references respectively belong to two different and nonanalogous arts. It would not be proper to combine these two disparate cited references, since they are from unconnected fields and are thus unobvious to combine.

Secondly, applicant notes that in Examiner's conclusion of unobviousness on page 3, lines 4-7 of the Office action mailed June 4, 2004, the purpose is stated to be to provide a film with low resistance to light transmission and high scratch resistance. However, the purpose of providing the filter of the present invention having high refractive index thin films with indium-tin oxide, is that the structure of the filter can have a reduced number of layers and can eliminate internal film stress (see, e.g., para. [0005] and page 5, lines 15-18 of the specification). There is no hint, suggestion or teaching in either of the two cited references that a film with indium-tin oxide used in a filter can reduce the number of layers and eliminate internal film stress of the filter. Pelekhaty is directed to providing a Fabry-Perot filter with particular transmission and reflection capabilities (col. 2, lines 25-30). Rancourt is directed to providing a filter assembly for improving the image of a cathode ray tube or other luminous display. The motivation for providing the novel structure of the optical filter of the present invention having the above-described advantages cannot be found in either Pelekhaty or Rancourt. This motivation resides only with the present inventors, as evidenced

in the specification filed. Therefore it would not have been obvious for one of ordinary skill in the art to combine Rancourt with Pelekhaty for the purposes of arriving at the present invention.

Thirdly, claim 1 recites: (I) the thin film filter including a glass substrate and a film stack with a plurality of cavities; and (II) each cavity having a first mirror layer, a second mirror layer, and a spacer located between the first and second mirror layers.

On page 2, lines 14-15 of said Office action, Examiner states that the filter of Pelekhaty comprises a glass substrate 200 and a film stack with a plurality of cavities 178, 182, 180 (Fig. 11). Examiner also states that the cavity 180 comprises a first mirror layer 194 and a second mirror layer 176. However, the cavity 180 as designated by Examiner does not have a spacer located between the first and second mirror layers 194, 176 (see also Fig. 10). Applicant asserts that the element 180 cannot be interpreted to be both a cavity and a spacer. Therefore, at best, the filter of Pelekhaty only reads on limitation (I) of claim 1. Rancourt only teaches a composition of indium-tin oxide used in an optical component. Rancourt fails to disclose a component reading on either of the limitations (I) and (II) of claim 1. In these circumstances, it is unobvious to derive a filter meeting both the limitations (I) and (II) from Pelekhaty in view of Rancourt.

In summary, the thin film filter of claim 1 of the present invention cannot reasonably be derived from Pelekhaty in view of Rancourt. Withdrawal of the rejection and allowance of the claim are respectfully requested.

Regarding claim 11, this recites a filter having a substrate and a film stack with five cavities. Each cavity has a plurality of layers. Each layer has low refractive index thin films and high refractive index thin films comprising a composition of indium-tin oxide having a refractive index of about 2.1. The total number of layers in the five cavities is about 160. Examiner concludes that the claimed filter would have been obvious to make in view of Pelekhaty and Rancourt.

Applicant traverses Examiner's reasoning in said Office action as follows:

Firstly, the two cited references respectively belong to two different and nonanalogous fields and cannot be combined, as discussed above with respect to claim 1.

Secondly, there is no hint, suggestion or teaching in either of the cited references that a film with indium-tin oxide used in a filter can reduce the number of layers and eliminate internal film stress of the filter, as discussed above with respect to claim 1.

Thirdly, the cited references fail to disclose, teach or suggest the refractive index of the high refractive index thin film (2.1), the number of cavities (5), and the number of layers (160). Examiner states the limitation of the number of cavities and the number of layers are an obvious duplication of known parts of the Pelekhaty reference. Applicant acknowledges that mere duplication in comparison with the prior art may not be patentable. However, applicant asserts that the present invention is not a "mere" duplication of prior art. A person of ordinary skill in the art knows that the number of cavities and layers of an optical filter materially affects the optical performance of the optical filter. Generally, the more layers an optical filter has, the narrower the pass bandwidth is. Generally, the more layers the optical filter has, the greater the attenuation. It is incumbent on one skilled in the art to select a particular number of layers that reconciles the usually competing objectives of narrow pass bandwidth and low attenuation in order to optimize the optical performance of the optical filter. That is, generally, both a relatively narrow pass bandwidth and relatively low attenuation are desired. Thus, the number of layers of the optical filter of the present invention is not a mere duplication of known art, but rather a deliberately calculated result. Therefore, the number of cavities (5) and the number of layers (160) cannot be obviously derived from the two cited references by simple duplication.

In summary, the thin film filter of claim 11 cannot reasonably be derived from Pelekhaty in view of Rancourt. Withdrawal of the rejection and allowance of the

claim are respectfully requested.

Regarding claims 2 and 12, Examiner states that Adair teaches the use of a coupling film 718 and the coupling film adjoins an adjacent cavity of the plurality of cavities (FIG. 7A), and that therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to include the coupling film of Adair in the Pelekhaty invention for the purpose of coherently coupling light between the successive cavities. Applicant traverses Examiner's reasoning as follows:

Examiner states that Adair teaches the use of a coupling film 718 and the coupling film adjoins an adjacent cavity of the plurality of cavities. However, the coupling film of the present invention adjoins an adjacent cavity of the plurality of cavities of the filter. The coupling film is an element of the filter; cf. the coupling film 718, which is a part of the optical switch. Even though a filter and an optical switch are components used in optical communications, the structure and function of the filter and of the optical switch are significantly different. There is no hint or suggestion to apply an element of an optical switch to a filter.

In any event, claims 2 and 12 respectively depend from claims 1 and 11, which are asserted to be allowable as detailed above. Therefore, claims 2 and 12 should be in a condition for allowance.

Regarding claims 3 and 13, these claims respectively depend from claims 2 and 12. Therefore, claims 3 and 13 should be in a condition for allowance.

Regarding claims 8 and 14, Examiner states that Pelekhaty in combination with Rancourt teaches the invention as claimed but lacks reference to the low refractive index material being silicon or aluminum oxide, and that Adair teaches the use of silicon as the low refractive index material in combination with indium tin oxide as the high refractive index material.

However, there is no suggestion in any of the cited references that the

combination of silicon oxide with indium tin oxide can be employed to solve the problem of internal film stress in an optical filter. In general, due to the multilayer design and film deposition process of multiple cavities in a film stack, the internal film stress is very high, which makes it extremely difficult to contain insertion loss in the film stack. The present invention has overcome this serious problem in optical filters by utilizing indium-tin oxide in the high refractive index material, which is not suggested in any of the cited references or any combinations thereof. Therefore, claims 8 and 14 should be considered as unobvious and should be in a condition for allowance.

Regarding claim 9, since claim 9 depends from claim 8, claim 9 should likewise be allowable.

Regarding claim 10, since claim 10 depends from claim 9, claim 10 should likewise be allowable.

Claim 6 was canceled without prejudice, and the rejection pertaining thereto is moot.

Regarding claim 7, this claim depends from claim 1, which is asserted to be allowable as detailed above. Therefore claim 7 should likewise be patentable.

If further argument is needed, the compound defined in claim 7 is a mixture of indium oxide and tin oxide. However, Mitsui teaches the compound having an indium content being between 0.1 and 30 percent and a gallium content being between 0.1 and 30 percent. A person of ordinary skill in the art cannot derive the compound of the present invention from Mitsui. Firstly, the composition of the compound is different. The composition of the compound in Mitsui comprises indium and gallium. The composition of the compound of claim 7 comprises indium oxide and tin oxide. Secondly, the percentages are substantially different in scope. The compound of Mitsui has an indium content of 0.1-30 percent and a gallium content of 0.1-30 percent. The compound of the present invention ranges from 20%

indium oxide plus 80% tin oxide to 17% indium oxide plus 83% tin oxide. The broad range of indium oxide provided by Mitsui is for the purpose of providing a thin film having a low *electrical* resistance. However, there is no suggestion in Mitsui that a narrower range within the broad range could yield desired high refractive index *optical* properties. There is no suggestion or motivation in Mitsui or any of the cited references to apply a mixture of indium oxide and tin oxide with a predetermined percent in order to obtain the filter as claimed.

In brief, none of the cited references address the **problem**, i.e., ***elimination of internal film stress***, and needless to say the **solution**, i.e., ***reduction of the layers by means of usage of indium-tin oxide.*** The mere fact the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested *the desirability of the modification*. In re Fritch, 972 F.2d 1260, 1266, n.14, 23 USPQ 2d 1780, 1783-84 n.14 (Fed. Cir. 1992). Without such a motivation, no obviousness could be concluded in the instant application.

In any event, in view of the above claim amendments and remarks, the subject application is believed to be in a condition for allowance, and an action to such effect is earnestly solicited.

Respectfully submitted,
Charles Leu et al.

By _____
Wei Te Chung

Registration No.: 43,325
Foxconn International, Inc.
P.O. Address: 1650 Memorex Drive, Santa Clara, CA 95050
Tel. No.: (408) 919-6137